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Immunological Patterns in Long-COVID: Evaluating Vascular Autoantibodies in Post-COVID Patients

Background: Post-COVID syndrome (long-COVID) encompasses a range of persistent symptoms that remain poorly understood. Emerging evidence suggests that vascular autoantibodies may contribute to chronic inflammation and endothelial dysfunction in these patients. This study aims to investigate the presence of vascular autoantibodies in post-COVID individuals and their potential associations with demographic factors, immune activity, and clinical outcomes.

Objective: To assess vascular autoantibody presence, focusing on the distribution of IgG and IgM antibodies and their potential links to demographic characteristics and immune persistence in long-COVID patients.

Methods: Serum samples from 73 post-COVID patients were analyzed. Vascular autoantibody profiles were assessed using gel electrophoresis and Western blot techniques, with proteins from internal mammary arteries separated via SDS-PAGE, and transferred onto nitrocellulose membranes. Primary antibodies specific to vascular autoantigens were used to detect target proteins, and chemiluminescent secondary antibodies were used for visualization. Statistical analyses examined differences in antibody production by demographic and clinical characteristics. This study was approved by the Hungarian Medical Research Council (IV/2505–3/2021/EKU).

Results: Of the 73 serum samples, 28 (38.36%) were positive for vascular autoantibodies, with 44 autoantibodies detected in total. Among these, 17 (38.63%) were IgG, and 27 (61.36%) were IgM, suggesting prolonged immune activation in certain patients. Female autoantibody-positive patients exhibited higher ranks of antibody production than males (Mann-Whitney U = 2347, $p = 0.0325$), indicating a stronger immune response. No significant correlations were found between autoantibody presence and other demographic, clinical, or laboratory values.

Conclusion: This study highlights the persistence of vascular autoantibodies in post-COVID patients, particularly IgM antibodies, suggesting ongoing immune activation. The higher antibody production in females indicates potential gender-based differences in immune responses. While direct clinical correlations were limited, these findings emphasize the need to explore immune persistence and demographic factors in shaping long-term outcomes. Future research should prioritize longitudinal studies to understand the trajectory of autoantibody production and its implications for disease progression and management.

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